

Pulmonary Artery Optical Coherence Tomography in Pediatric cases of Pulmonary Arterial Hypertension

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Introduction: Optical Coherence Tomography (OCT) is a high-resolution (10microns) intravascular imaging technique using near infra-red light. Widely used to image coronary arteries, pulmonary artery (PA) imaging is less well described. We performed OCT on the pulmonary arteries of children with pulmonary arterial hypertension and controls with the hypothesis that alterations within the vessel wall of the pulmonary arteries could be seen in association with pulmonary arterial hypertension.

Methods and Results: Pulmonary artery OCT was performed in six patients plus ten controls. Subjects were from 2-11 years of age (4 female). Diagnosis; idiopathic pulmonary hypertension (PHT) 2; late repair left to right shunt 2, repair Trisomy 21 with associated shunt lesion n=2. Medication at time of study; Nil n=1, phosphodiesterase inhibitor/endothelin inhibitor n=2, triple therapy with Treprostinil n=2. Pulmonary Vascular resistance (on therapy) 3-10 Woods units; nil therapy 12 Woods units. Control patients were age and weight matched undergoing either diagnostic or electrophysiology study. Serial measurements were made along the length of the vessel using digital planimetry to calculate wall thickness (mm) and wall:vessel cross sectional area (CSA) ratio for each case. Median pulmonary artery wall thickness for the pulmonary arterial hypertension patients was 0.18mm (IQR 0.17-0.21mm) and for controls was 0.11mm (IQR 0.10-0.12mm) (p 0.002). Median pulmonary artery wall:vessel CSA ratio for the pulmonary arterial hypertension patients was 0.19 (IQR 0.19-0.22) and for controls was 0.13 (IQR 0.11-0.15) (p = 0.002). As there was a significant difference between our pulmonary arterial hypertension and control groups with regard age and weight, we made an additional comparison with a younger control group. A statistically significant difference persisted for wall thickness and wall:vessel cross sectional area ratio (p=0.025). There were no complications.

Conclusion: Pulmonary artery OCT is feasible in children and identifies increased wall thickness in pulmonary arterial hypertension. PA OCT can be used to recognise reverse PA wall remodelling in response to treatment. Further studies are required to assess if OCT can help distinguish between causes of pulmonary arterial hypertension in children and degree of vessel fibrosis.